Centre Spatial de Liège
Université de Liège

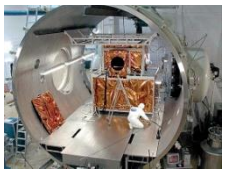
Groupe Astro Physique des Hautes Energies

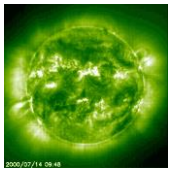
Astrophysique Stellaire Théorique et Astérosismologie

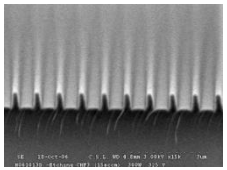
Design, assembly and test of a near-infrared spectrograph for the TIGRE telescope

STAR Workshop

15/09/2017 – Mont Rigi





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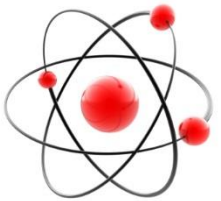
Project overview – *Why studying massive stars ?*

- **Massive? Initial mass above** $8\ M_{Sun}$

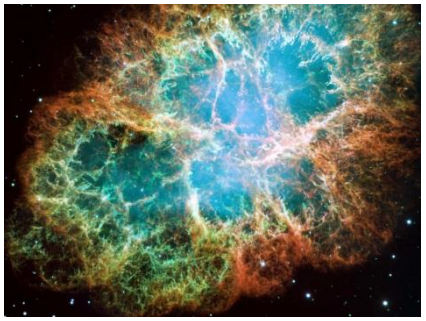
  $\rightarrow$ *Production of heavy elements*



- **High temperature:** $20000K \rightarrow 120000K$

- **Mass loss:** $10^{-7} \rightarrow 10^{-3}\ M_{sun}\ yr^{-1}$

  $\rightarrow$ *Stellar wind* $\gg$



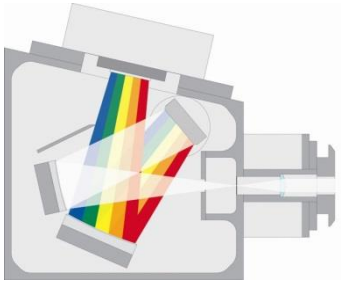
- **Death:** *gigantic supernova*

They are key players for the evolution of the universe !

Project overview – *New instruments*

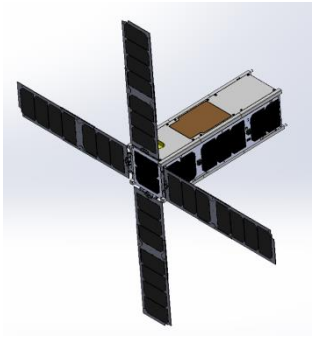
- **Near-IR spectrograph**

  → mounted on the TIGRE **(ground)**



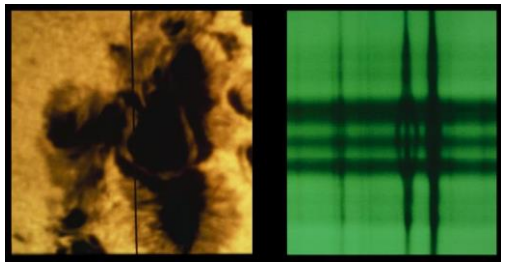
- **UV observing nano-satellite**

  → feasibility study **(space)**



- **UV-VIS Spectropolarimeter**

  → pre-phase-A and phase-A **(space)**

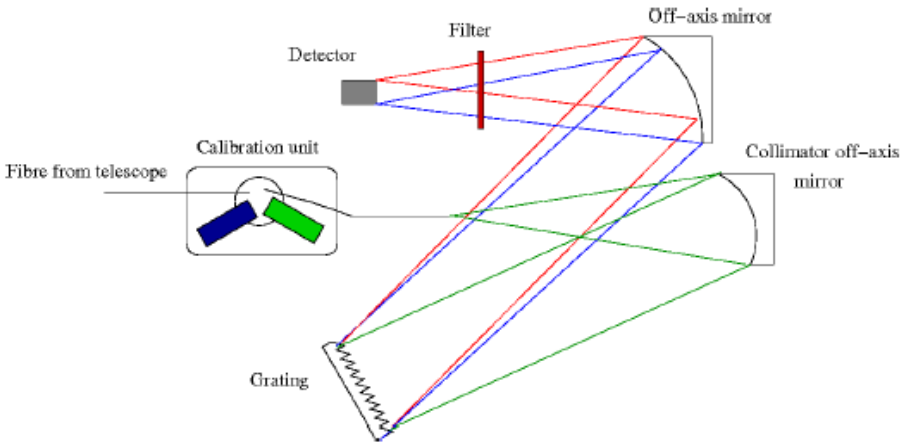


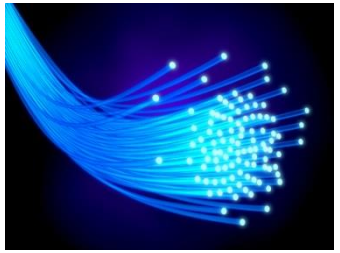
Project overview – *Near-IR spectrograph*

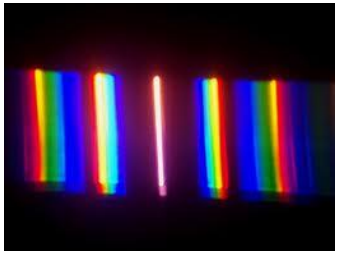
- **Resolving power needed:** 10 000 (goal 20 000)
- **Spectral domain:** 1 to 1,1 μm
- **Detector trade-off:**

  → CCD or specific IR detector ?
- **Versatile interface:**

  → fibre-fed
- **Should be adaptable to other telescopes (ARIES)**





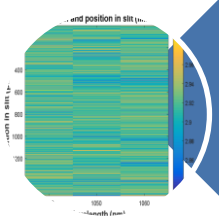


PhD summary– *Flowchart*

From scientific requirements to instrumental specification

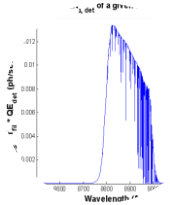
Bibliography on spectroscopy, fibers, detector technologies

Optical design



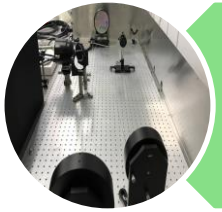
First scratch, resolution power, tolerancing, calibration, straylight, alignment, SPS, …

Photometric budget



@ TIGRE,
@ Liège,
SPS,
observing strategy

Alignment and tests in laboratory

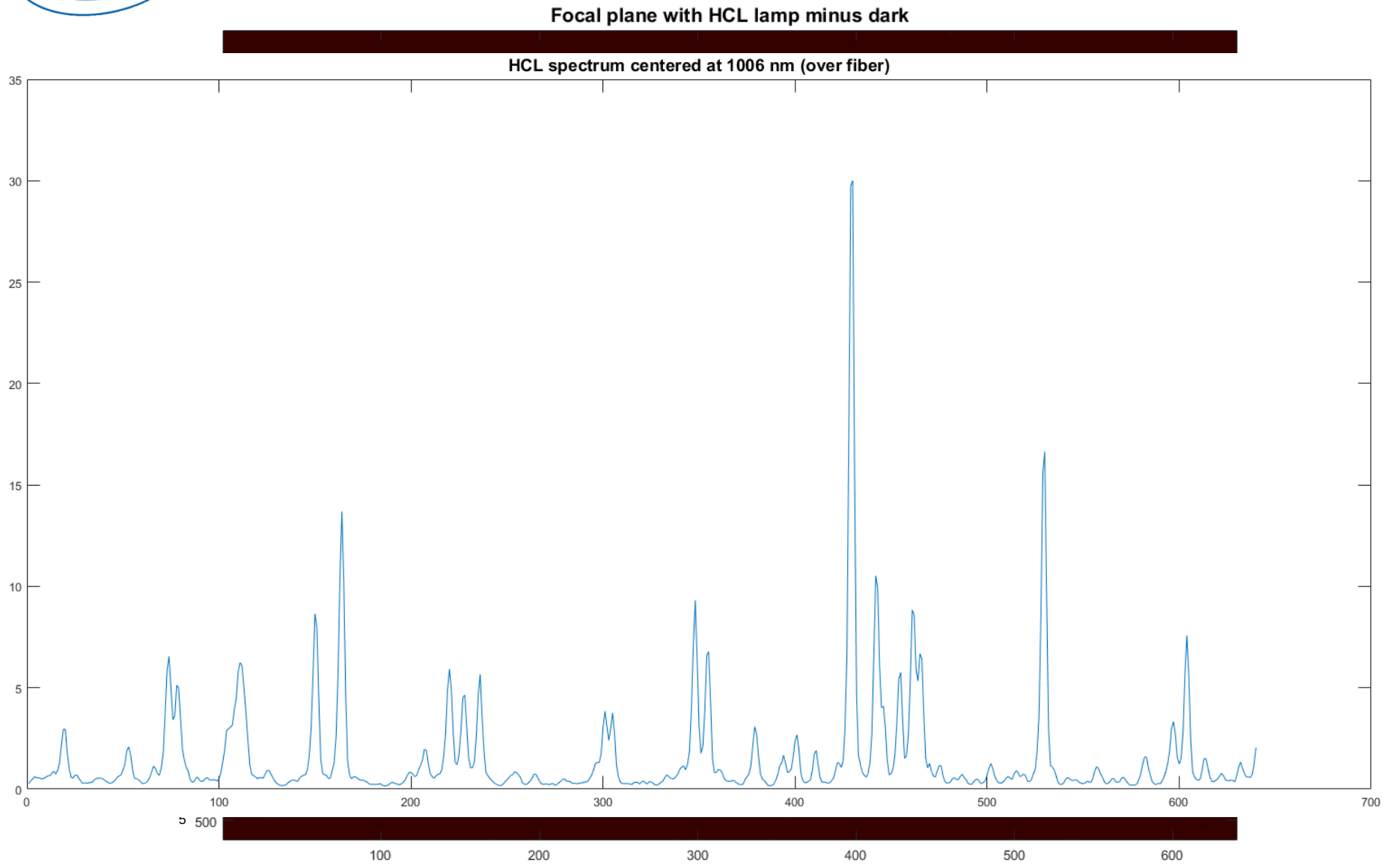


Assemble and align optical components

First light

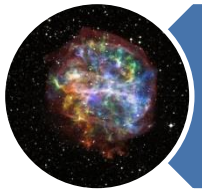
First light ?
Debugging, first light ?
Debugging, first light ?
Debugging …

Instrument performances – *Some (lab) results*

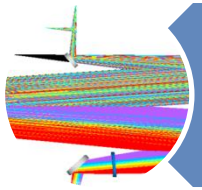


Observation – *Close to first light*

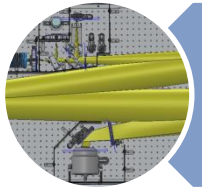
Conclusion



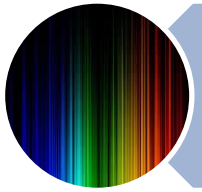
Different instruments, same goal… study massive stars!



From scientific requirements to first light



Performances are validated in lab



First light: coming soon!

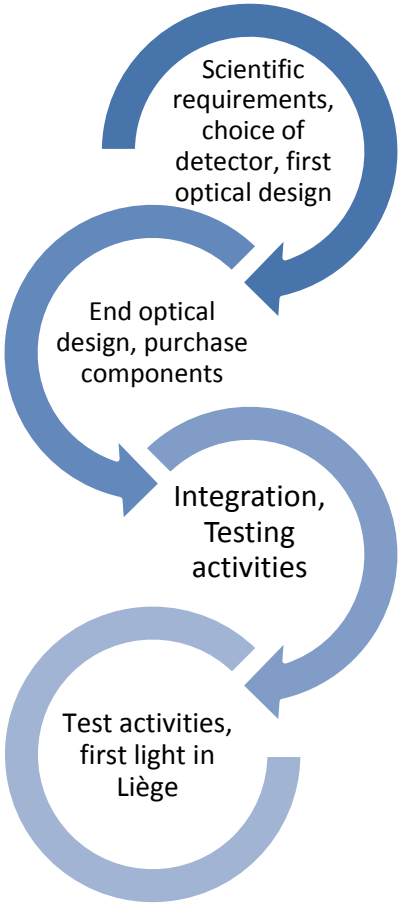
IR Spectrograph

2013-2014

2014-2015

2015-2016

2016-2017



Thank you for your attention

Any question ?